

REMARKS

In this Response, Applicants do not amend or cancel any claims. Claim 15 is added. Claims 1-15 remain in the Application. Reconsideration of the pending claims is respectfully requested in view of the above amendments and the following remarks.

I. Claims Rejected Under 35 U.S.C. § 103(a)

A. Claims 1-6 and 11-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,841,799 issued to Hiroki ("Hiroki") in view of U.S. Patent No. 6,018,541 issued to Huang ("Huang"). Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, the relied upon references must teach or suggest every limitation of the claim such that the invention as a whole would have been obvious at the time the invention was made to one skilled in the art.

Among other elements, amended Claim 1 recites:

"A self-mode locked multi-section semiconductor laser diode, for generating high-frequency optical pulsation and controlling the pulsation frequency.... where high-frequency optical pulsation can be generated and the pulsation frequency can be varied in a wide range according to the phase and strength of the feedback laser light."

Applicants submit that Hiroki in view of Huang does not teach or suggest at least these elements of Claim 1.

Hiroki discloses a multi-section semiconductor laser having a phase control region between two active regions (Figure 7). By controlling current injected into these regions, the emission mode of the laser alternates between a transverse electric (TE) mode and a transverse magnetic (TM) mode (col. 9, lines 21-31). Optical intensity is modulated when the optical output from the laser passes through a polarizer (col. 9, lines 27-31, and col. 7, line 62-col. 8, line 9). Thus, optical intensity modulation is achieved by means of current modulation using the laser and a polarizer.

Hiroki does not disclose a multi-section semiconductor laser diode that generates high-frequency optical pulsation. Rather, the laser described by Hiroki outputs TM mode and TE mode light. Light in TM and TE modes is not optical pulsation. To obtain optical pulsation

(e.g., zero-one signals), Hiroki requires that the laser be connected to an external polarizer such that the laser output in either TM or TE mode can pass through the polarizer. Hiroki's laser, in and of itself, does not generate optical pulsation. Thus, Hiroki does not teach or suggest the claimed multi-section semiconductor laser diode that generates high-frequency optical pulsation.

Moreover, the physical concept of Hiroki is completely different from the claimed invention. None of the ten embodiments disclosed by Hiroki has the same physical structure as Applicants' invention. Further, in Hiroki, intensity modulation occurs as a result of current modulation. By contrast, Applicants' invention uses DC currents, and the laser emits optical pulsation without an external polarizer.

Huang does not cure the defects of Hiroki. Huang is relied on for disclosing a complex-coupled DFB laser section. However, Huang does not teach or suggest the claimed multi-section semiconductor laser diode that generates high-frequency optical pulsation. Thus, Hiroki in view of Huang does not teach or suggest each of the elements of amended Claim 1. Claims 2-6 and 11-12 depend from Claim 1 and incorporate the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, these claims are non-obvious over Hiroki in view of Huang. Accordingly, reconsideration and withdrawal of the § 103 rejection of Claims 1-6 and 11-12 are requested.

B. Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hiroki and Huang in view of U.S. Patent No. 5,177,758 issued to Oka et al ("Oka").

Claim 9 depends from Claim 1 and incorporates the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, Hiroki and Huang do not teach or suggest each of the elements of Claim 9.

Oka is relied on for disclosing a central axis of a phase control section that aligns with the active sections. However, Oka does not teach or suggest does not teach or suggest the claimed multi-section semiconductor laser diode that generates high-frequency optical pulsation. Thus, Hiroki and Huang in view of Oka do not teach or suggest each of the elements of amended Claim 1 and its dependent claim, namely, Claim 9. Accordingly, reconsideration and withdrawal of the § 103 rejection of Claim 9 is requested.

C. Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hiroki and Huang in view of U.S. Patent No. 4,995,048 issued to Kuindersma et al (“Kuindersma”).

Claim 13 depends from Claim 1 and incorporates the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, Hiroki and Huang do not teach or suggest each of the elements of Claim 13.

Kuindersma is relied on for disclosing an amplifier section located between a DFB and the phase control sections. However, Kuindersma does not teach or suggest does not teach or suggest the claimed multi-section semiconductor laser diode that generates high-frequency optical pulsation. Thus, Hiroki and Huang in view of Kuindersma do not teach or suggest each of the elements of amended Claim 1 and its dependent claim, namely, Claim 13. Accordingly, reconsideration and withdrawal of the § 103 rejection of Claim 13 is requested.

D. Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hiroki and Huang in view of U.S. Patent No. 6,031,860 issued to Nitta et al (“Nitta”).

Claim 14 depends from Claim 1 and incorporates the limitations thereof. Thus, for at least the reasons mentioned above in regard to Claim 1, Hiroki and Huang do not teach or suggest each of the elements of Claim 14.

Nitta is relied on for disclosing the use of an HR coating. However, Nitta does not teach or suggest does not teach or suggest the claimed multi-section semiconductor laser diode that generates high-frequency optical pulsation. Thus, Hiroki and Huang in view of Nitta do not teach or suggest each of the elements of amended Claim 1 and its dependent claim, namely, Claim 14. Accordingly, reconsideration and withdrawal of the § 103 rejection of Claim 14 is requested.

E. With respect to New Claim 15, among other elements, Claim 15 recites:

“A self-mode locked multi-section semiconductor laser diode, for generating high-frequency optical pulsation and controlling the pulsation frequency.... wherein the multi-section semiconductor laser diode outputs high-frequency optical pulsation and the pulsation frequency can be varied in a wide range according to the phase and strength of the feedback laser light.” For similar reasons mentioned above in regard to Claim 1, none of the cited references teach or suggest each of the elements of Claim 15. Accordingly, allowance of Claim 15 is requested.

II. Allowable Subject Matter

Applicants note with appreciation the Examiner's indication that Claims 7, 8, and 10 would be allowable if rewritten in independent form. Applicants respectfully submit that the amendment to Claim 1 has obviated the need to rewrite these claims. As Claim 1 is in condition for allowance, its dependent claims are allowable at least for the reasons mentioned in regard to Claim 1. Accordingly, reconsideration and withdrawal of the objection of Claims 7, 8, and 10 are requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending patentability define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

Respectfully submitted,

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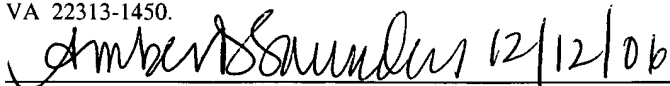
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